



SEQUENCE LISTING

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(1) GENERAL INFORMATION:

(i) APPLICANT: Mukamolova, Galina V. et al.

(ii) TITLE OF INVENTION: Bacterial Pheromones and Uses Therefor

(iii) NUMBER OF SEQUENCES: 59

(iv) CORRESPONDENCE ADDRESS:

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(F) ZIP: 02109-1875

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk

(B) COMPUTER: IBM PC compatible

(C) OPERATING SYSTEM: PC-DOS/MS-DOS

(D) SOFTWARE: PatentIn Release #1.0, Version #1.25

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: 09/445,289

(B) FILING DATE: 2000-MAY-11

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(B) FILING DATE: 04-JUN-1997

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(B) FILING DATE: 27-MAY-1998

(viii) ATTORNEY/AGENT INFORMATION:

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(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 362 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

Met Leu Arg Leu Val Val Gly Ala Leu Leu Leu Val Leu Ala Phe Ala
1 5 10 15

Gly Gly Tyr Ala Val Ala Ala Cys Lys Thr Val Thr Leu Thr Val Asp
20 25 30

Gly Thr Ala Met Arg Val Thr Thr Met Lys Ser Arg Val Ile Asp Ile
35 40 45

Val Glu Glu Asn Gly Phe Ser Val Asp Asp Arg Asp Asp Leu Tyr Pro
50 55 60

Ala Ala Gly Val Gln Val His Asp Ala Asp Thr Ile Val Leu Arg Arg
65 70 75 80

Ser Arg Pro Leu Gln Ile Ser Leu Asp Gly His Asp Ala Lys Gln Val
85 90 95

Trp Thr Thr Ala Ser Thr Val Asp Glu Ala Leu Ala Gln Leu Ala Met
100 105 110

Thr Asp Thr Ala Pro Ala Ala Ala Ser Arg Ala Ser Arg Val Pro Leu
115 120 125

Ser Gly Met Ala Leu Pro Val Val Ser Ala Lys Thr Val Gln Leu Asn
130 135 140

Asp Gly Gly Leu Val Arg Thr Val His Leu Pro Ala Pro Asn Val Ala
145 150 155 160

Gly Leu Leu Ser Ala Ala Gly Val Pro Leu Leu Gln Ser Asp His Val
165 170 175

Val Pro Ala Ala Thr Ala Pro Ile Val Glu Gly Met Gln Ile Gln Val
180 185 190

Thr Arg Asn Arg Ile Lys Lys Val Thr Glu Arg Leu Pro Leu Pro Pro
195 200 205

Asn Ala Arg Arg Val Glu Asp Pro Glu Met Asn Met Ser Arg Glu Val
210 215 220

Val Glu Asp Pro Gly Val Pro Gly Thr Gln Asp Val Thr Phe Ala Val
225 230 235 240

Ala Glu Val Asn Gly Val Glu Thr Gly Arg Leu Pro Val Ala Asn Val
245 250 255

Val Val Thr Pro Ala His Glu Ala Val Val Arg Val Gly Thr Lys Pro
260 265 270

Gly Thr Glu Val Pro Pro Val Ile Asp Gly Ser Ile Trp Asp Ala Ile
275 280 285

Ala Gly Cys Glu Ala Gly Gly Asn Trp Ala Ile Asn Thr Gly Asn Gly
 290 295 300

Tyr Tyr Gly Gly Val Gln Phe Asp Gln Gly Thr Trp Glu Ala Asn Gly
 305 310 315 320

Gly Leu Arg Tyr Ala Pro Arg Ala Asp Leu Ala Thr Arg Glu Glu Gln
 325 330 335

Ile Ala Val Ala Glu Val Thr Arg Leu Arg Gln Gly Trp Gly Ala Trp
 340 345 350

Pro Val Cys Ala Ala Arg Ala Gly Ala Arg
 355 360

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 188 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Met Pro Val Gly Trp Leu Trp Arg Ala Arg Thr Ala Lys Gly Thr Thr
 1 5 10 15

Leu Lys Asn Ala Arg Thr Thr Leu Ile Ala Ala Ala Ile Ala Gly Thr
 20 25 30

Leu Val Thr Thr Ser Pro Ala Gly Ile Ala Asn Ala Asp Asp Ala Gly
 35 40 45

Leu Asp Pro Asn Ala Ala Ala Gly Pro Asp Ala Val Gly Phe Asp Pro
 50 55 60

Asn Leu Pro Pro Ala Pro Asp Ala Ala Pro Val Asp Thr Pro Pro Ala
 65 70 75 80

Pro Glu Asp Ala Gly Phe Asp Pro Asn Leu Pro Pro Pro Leu Ala Pro
 85 90 95

Asp Phe Leu Ser Pro Pro Ala Glu Glu Ala Pro Pro Val Pro Val Ala
 100 105 110

Tyr Ser Val Asn Trp Asp Ala Ile Ala Gln Cys Glu Ser Gly Gly Asn
 115 120 125

Trp Ser Ile Asn Thr Gly Asn Gly Tyr Tyr Gly Gly Leu Arg Phe Thr
 130 135 140

Ala Gly Thr Trp Arg Ala Asn Gly Gly Ser Gly Ser Ala Ala Asn Ala
 145 150 155 160

Ser Arg Glu Glu Gln Ile Arg Val Ala Glu Asn Val Leu Arg Ser Gln

165

170

175

Gly Ile Arg Ala Trp Pro Val Cys Gly Arg Arg Gly
180 185

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 174 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Met Ser Glu Ser Tyr Arg Lys Leu Thr Thr Ser Ser Ile Ile Val Ala
1 5 10 15

Lys Ile Thr Phe Thr Gly Ala Met Leu Asp Gly Ser Ile Ala Leu Ala
20 25 30

Gly Gln Ala Ser Pro Ala Thr Asp Ser Glu Trp Asp Gln Val Ala Arg
35 40 45

Cys Glu Ser Gly Gly Asn Trp Ser Ile Asn Thr Gly Asn Gly Tyr Leu
50 55 60

Gly Gly Leu Gln Phe Ser Gln Gly Thr Trp Ala Ser His Gly Gly Gly
65 70 75 80

Glu Tyr Ala Pro Ser Ala Gln Leu Ala Thr Arg Glu Gln Gln Ile Ala
85 90 95

Val Ala Glu Arg Val Leu Ala Thr Gln Gly Ser Gly Ala Trp Pro Ala
100 105 110

Cys Gly His Gly Leu Ser Gly Pro Ser Leu Gln Glu Val Leu Pro Ala
115 120 125

Gly Met Gly Ala Pro Trp Ile Asn Gly Ala Pro Ala Pro Leu Ala Pro
130 135 140

Pro Pro Pro Ala Glu Pro Ala Pro Pro Gln Pro Pro Ala Asp Asn Phe
145 150 155 160

Pro Pro Thr Pro Gly Asp Val Pro Ser Pro Leu Ala Arg Pro
165 170

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 407 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met Ser Gly Arg His Arg Lys Pro Thr Thr Ser Asn Val Ser Val Ala
 1 5 10 15
 Lys Ile Ala Phe Thr Gly Ala Val Leu Gly Gly Gly Gly Ile Ala Met
 20 25 30
 Ala Ala Gln Ala Thr Ala Ala Thr Asp Gly Glu Trp Asp Gln Val Ala
 35 40 45
 Arg Cys Glu Ser Gly Gly Asn Trp Ser Ile Asn Thr Gly Asn Gly Tyr
 50 55 60
 Leu Gly Gly Leu Gln Phe Thr Gln Ser Thr Trp Ala Ala His Gly Gly
 65 70 75 80
 Gly Glu Phe Ala Pro Ser Ala Gln Leu Ala Ser Arg Glu Gln Gln Ile
 85 90 95
 Ala Val Gly Glu Arg Val Leu Ala Thr Gln Gly Arg Gly Ala Trp Pro
 100 105 110
 Val Cys Gly Arg Gly Leu Ser Asn Ala Thr Pro Arg Glu Val Leu Pro
 115 120 125
 Ala Ser Ala Ala Met Asp Ala Pro Leu Asp Ala Ala Ala Val Asn Gly
 130 135 140
 Glu Pro Ala Pro Leu Ala Pro Pro Pro Ala Asp Pro Ala Pro Pro Val
 145 150 155 160
 Glu Leu Ala Ala Asn Asp Leu Pro Ala Pro Leu Gly Glu Pro Leu Pro
 165 170 175
 Ala Ala Pro Ala Asp Pro Ala Pro Pro Ala Asp Leu Ala Pro Pro Ala
 180 185 190
 Pro Ala Asp Val Ala Pro Pro Val Glu Leu Ala Val Asn Asp Leu Pro
 195 200 205
 Ala Pro Leu Gly Glu Pro Leu Pro Ala Ala Pro Ala Asp Pro Ala Pro
 210 215 220
 Pro Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala Pro Pro Ala
 225 230 235 240
 Pro Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala Pro Pro Val
 245 250 255
 Glu Leu Ala Val Asn Asp Leu Pro Ala Pro Leu Gly Glu Pro Leu Pro
 260 265 270
 Ala Ala Pro Ala Glu Leu Ala Pro Pro Ala Asp Leu Ala Pro Ala Ser
 275 280 285

Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala Pro Pro Ala Pro
 290 295 300

Ala Glu Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala Pro Pro Ala Ala
 305 310 315 320

Val Asn Glu Gln Thr Ala Pro Gly Asp Gln Pro Ala Thr Ala Pro Gly
 325 330 335

Gly Pro Val Gly Leu Ala Thr Asp Leu Glu Leu Pro Glu Pro Asp Pro
 340 345 350

Gln Pro Ala Asp Ala Pro Pro Pro Gly Asp Val Thr Glu Ala Pro Ala
 355 360 365

Glu Thr Pro Gln Val Ser Asn Ile Ala Tyr Thr Lys Lys Leu Trp Gln
 370 375 380

Ala Ile Arg Ala Gln Asp Val Cys Gly Asn Asp Ala Leu Asp Ser Leu
 385 390 395 400

Ala Gln Pro Tyr Val Ile Gly
 405

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 155 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Met Pro Gly Glu Met Leu Asp Val Arg Lys Leu Cys Lys Leu Phe Val
 1 5 10 15

Lys Ser Ala Val Val Ser Gly Ile Val Thr Ala Ser Met Ala Leu Ser
 20 25 30

Thr Ser Thr Gly Met Ala Asn Ala Val Pro Arg Glu Pro Asn Trp Asp
 35 40 45

Ala Val Ala Gln Cys Glu Ser Gly Arg Asn Trp Arg Ala Asn Thr Gly
 50 55 60

Asn Gly Phe Tyr Gly Gly Leu Gln Phe Lys Pro Thr Ile Trp Ala Arg
 65 70 75 80

Tyr Gly Gly Val Gly Asn Pro Ala Gly Ala Ser Arg Glu Gln Gln Ile
 85 90 95

Thr Val Ala Asn Arg Val Leu Ala Asp Gln Gly Leu Asp Ala Trp Pro
 100 105 110

Lys Cys Gly Ala Ala Ser Asp Leu Pro Ile Thr Leu Trp Ser His Pro

115	120	125
Ala Gln Gly Val Lys Gln Ile Ile Asn Asp Ile Ile Gln Met Gly Asp		
130	135	140
Thr Thr Leu Ala Ala Ile Ala Leu Asn Gly Leu		
145	150	155

(2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 176 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

Met His Pro Leu Pro Ala Asp His Gly Arg Ser Arg Cys Asn Arg His
1 5 10 15

Pro Ile Ser Pro Leu Ser Leu Ile Gly Asn Ile Ser Ala Thr Ser Gly
20 25 30

Asp Met Ser Ser Met Thr Arg Ile Ala Lys Pro Leu Ile Lys Ser Ala
35 40 45

Met Ala Ala Gly Leu Val Thr Ala Ser Met Ser Leu Ser Thr Ala Val
50 55 60

Ala His Ala Gly Pro Ser Pro Asn Trp Asp Ala Val Ala Gln Cys Glu
65 70 75 80

Ser Gly Gly Asn Trp Ala Ala Asn Thr Gly Asn Gly Lys Tyr Gly Gly
85 90 95

Leu Gln Phe Lys Pro Ala Thr Trp Ala Ala Phe Gly Gly Val Gly Asn
100 105 110

Pro Ala Ala Ala Ser Arg Glu Gln Gln Ile Ala Val Ala Asn Arg Val
115 120 125

Leu Ala Glu Gln Gly Leu Asp Ala Trp Pro Thr Cys Gly Ala Ala Ser
130 135 140

Gly Leu Pro Ile Ala Leu Trp Ser Lys Pro Ala Gln Gly Ile Lys Gln
145 150 155 160

Ile Ile Asn Glu Ile Ile Trp Ala Gly Ile Gln Ala Ser Ile Pro Arg
165 170 175

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 154 amino acids

(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

Met Thr Pro Gly Leu Leu Thr Thr Ala Gly Ala Gly Arg Pro Arg Asp
1 5 10 15
Arg Cys Ala Arg Ile Val Cys Thr Val Phe Ile Glu Thr Ala Val Val
20 25 30
Ala Thr Met Phe Val Ala Leu Leu Gly Leu Ser Thr Ile Ser Ser Lys
35 40 45
Ala Asp Asp Ile Asp Trp Asp Ala Ile Ala Gln Cys Glu Ser Gly Gly
50 55 60
Asn Trp Ala Ala Asn Thr Gly Asn Gly Leu Tyr Gly Gly Leu Gln Ile
65 70 75 80
Ser Gln Ala Thr Trp Asp Ser Asn Gly Gly Val Gly Ser Pro Ala Ala
85 90 95
Ala Ser Pro Gln Gln Gln Ile Glu Val Ala Asp Asn Ile Met Lys Thr
100 105 110
Gln Gly Pro Gly Ala Trp Pro Lys Cys Ser Ser Cys Ser Gln Gly Asp
115 120 125
Ala Pro Leu Gly Ser Leu Thr His Ile Leu Thr Phe Leu Ala Ala Glu
130 135 140
Thr Gly Gly Cys Ser Gly Ser Arg Asp Asp
145 150

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 99 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

Ile Arg Thr Ala Ala Val Thr Leu Val Ala Ala Thr Ala Leu Gly Ala
1 5 10 15
Thr Gly Glu Ala Val Ala Ala Pro Ser Ala Pro Leu Arg Thr Asp Trp
20 25 30
Asp Ala Ile Ala Ala Cys Glu Ser Ser Gly Asn Trp Gln Ala Asn Thr
35 40 45

Gly Asn Gly Tyr Tyr Gly Gly Leu Gln Phe Ala Arg Ser Ser Trp Ile
 50 55 60

Ala Ala Gly Gly Leu Lys Tyr Ala Pro Arg Ala Asp Leu Ala Thr Arg
 65 70 75 80

Gly Glu Gln Ile Ala Val Ala Glu Arg Leu Ala Arg Leu Gln Gly Met
 85 90 95

Ser Ala Trp

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 438 amino acids

(B) TYPE: amino acid

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Met Gly Glu Arg Glu Gly Arg Val Asp Ser Leu Leu Asp Thr Leu Tyr
 1 5 10 15

Asn Leu Ser Glu Glu Lys Glu Ala Phe Phe Ile Thr Gln Lys Met Lys
 20 25 30

Lys Leu Phe Ser Val Lys Leu Ser Lys Ser Lys Val Ile Leu Val Ala
 35 40 45

Ala Cys Leu Leu Leu Ala Gly Ser Gly Thr Ala Tyr Ala Ala His Glu
 50 55 60

Leu Thr Lys Gln Ser Val Ser Val Ser Ile Asn Gly Lys Lys Lys His
 65 70 75 80

Ile Arg Thr His Ala Asn Thr Val Gly Asp Leu Leu Glu Thr Leu Asp
 85 90 95

Ile Lys Thr Arg Asp Glu Asp Lys Ile Thr Pro Ala Lys Gln Thr Lys
 100 105 110

Ile Thr Ala Asp Met Asp Val Val Tyr Glu Ala Ala Lys Pro Val Lys
 115 120 125

Leu Thr Ile Asn Gly Glu Glu Lys Thr Leu Trp Ser Thr Ala Lys Thr
 130 135 140

Val Gly Ala Leu Leu Asp Glu Gln Asp Val Asp Val Lys Glu Gln Asp
 145 150 155 160

Gln Ile Asp Pro Ala Ile Asp Thr Asp Ile Ser Lys Asp Met Lys Ile
 165 170 175

Asn Ile Glu Pro Ala Phe Gln Val Thr Val Asn Asp Ala Gly Lys Gln

180					185					190					
Lys	Lys	Ile	Trp	Thr	Thr	Ser	Thr	Thr	Val	Ala	Asp	Phe	Leu	Lys	Gln
		195					200					205			
Gln	Lys	Met	Asn	Ile	Lys	Asp	Glu	Asp	Lys	Ile	Lys	Pro	Ala	Leu	Asp
	210					215					220				
Ala	Lys	Leu	Thr	Lys	Gly	Lys	Ala	Asp	Ile	Thr	Ile	Thr	Arg	Ile	Glu
225						230					235				240
Lys	Val	Thr	Asp	Val	Val	Glu	Glu	Lys	Ile	Ala	Phe	Asp	Val	Lys	Lys
				245					250					255	
Gln	Glu	Asp	Ala	Ser	Leu	Glu	Lys	Gly	Lys	Glu	Lys	Val	Val	Gln	Lys
			260					265					270		
Gly	Lys	Glu	Gly	Lys	Leu	Lys	Lys	His	Phe	Glu	Val	Val	Lys	Glu	Asn
		275					280						285		
Gly	Lys	Glu	Val	Ser	Arg	Glu	Leu	Val	Lys	Glu	Glu	Thr	Ala	Glu	Gln
	290					295						300			
Ser	Lys	Asp	Lys	Val	Ile	Ala	Val	Gly	Thr	Lys	Gln	Ser	Ser	Pro	Lys
305						310					315				320
Phe	Glu	Thr	Val	Ser	Ala	Ser	Gly	Asp	Ser	Lys	Thr	Val	Val	Ser	Arg
				325					330					335	
Ser	Asn	Glu	Ser	Thr	Gly	Lys	Val	Met	Thr	Val	Ser	Ser	Thr	Ala	Tyr
			340					345					350		
Thr	Ala	Ser	Cys	Ser	Gly	Cys	Ser	Gly	His	Thr	Ala	Thr	Gly	Val	Asn
		355					360					365			
Leu	Lys	Asn	Asn	Pro	Asn	Ala	Lys	Val	Ile	Ala	Val	Asp	Pro	Asn	Val
	370					375					380				
Ile	Pro	Leu	Gly	Ser	Lys	Val	His	Val	Glu	Gly	Tyr	Gly	Tyr	Ala	Ile
385						390					395				400
Ile	Ala	Ala	Asp	Thr	Gly	Ser	Ala	Ile	Lys	Gly	Asn	Lys	Ile	Asp	Val
				405					410					415	
Phe	Phe	Pro	Ser	Lys	Ser	Asp	Ala	Ser	Asn	Trp	Gly	Val	Lys	Thr	Val
			420					425					430		
Ser	Val	Lys	Val	Leu	Asn										
			435												

(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 288 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Met Lys Lys Thr Ile Met Ser Phe Val Ala Val Ala Ala Leu Ser Thr
1 5 10 15

Thr Ala Phe Gly Ala His Ala Ser Ala Lys Glu Ile Thr Val Gln Lys
20 25 30

Gly Asp Thr Leu Trp Gly Ile Ser Gln Lys Asn Gly Val Asn Leu Lys
35 40 45

Asp Leu Lys Glu Trp Asn Lys Leu Thr Ser Asp Lys Ile Ile Ala Gly
50 55 60

Glu Lys Leu Thr Ile Ser Ser Glu Glu Thr Thr Thr Thr Gly Gln Tyr
65 70 75 80

Thr Ile Lys Ala Gly Asp Thr Leu Ser Lys Ile Ala Gln Lys Phe Gly
85 90 95

Thr Thr Val Asn Asn Leu Lys Val Trp Asn Asn Leu Ser Ser Asp Met
100 105 110

Ile Tyr Ala Gly Ser Thr Leu Ser Val Lys Gly Gln Ala Thr Ala Ala
115 120 125

Asn Thr Ala Thr Glu Asn Ala Gln Thr Asn Ala Pro Gln Ala Ala Pro
130 135 140

Lys Gln Glu Ala Val Gln Lys Glu Gln Pro Lys Gln Glu Ala Val Gln
145 150 155 160

Gln Gln Pro Lys Gln Glu Thr Lys Ala Glu Ala Glu Thr Ser Val Asn
165 170 175

Thr Glu Glu Lys Ala Val Gln Ser Asn Thr Asn Asn Gln Glu Ala Ser
180 185 190

Lys Glu Leu Thr Val Thr Ala Thr Ala Tyr Thr Ala Asn Asp Gly Gly
195 200 205

Ile Ser Gly Val Thr Ala Thr Gly Ile Asp Leu Asn Lys Asn Pro Asn
210 215 220

Ala Lys Val Ile Ala Val Asp Pro Asn Val Ile Pro Leu Gly Ser Lys
225 230 235 240

Val Tyr Val Glu Gly Tyr Gly Glu Ala Thr Thr Ala Ala Asp Thr Gly
245 250 255

Gly Ala Ile Lys Gly Asn Lys Ile Asp Val Phe Val Pro Glu Lys Ser
260 265 270

Ser Ala Tyr Arg Trp Gly Asn Lys Thr Val Lys Ile Lys Ile Leu Asn
275 280 285

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 320 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Lys Arg Xaa Xaa Ala Val Ile Leu Met Val Ala Val Ile Phe Thr Ile
 1 5 10 15
 Ile Ser Ser Met Lys Lys Asn Ile Thr Val Asn Ile Asp Gly Lys Thr
 20 25 30
 Ser Lys Ile Ile Thr Tyr Lys Ser Asn Glu Gly Ser Ile Leu Ser Lys
 35 40 45
 Asn Asn Ile Leu Val Gly Pro Lys Asp Lys Ile Gln Pro Ala Leu Asp
 50 55 60
 Thr Asn Leu Lys Asn Gly Asp Lys Ile Tyr Ile Lys Lys Ala Ile Ser
 65 70 75 80
 Val Glu Val Ala Val Asp Gly Lys Val Arg Arg Val Lys Ser Ser Glu
 85 90 95
 Glu Thr Val Ser Lys Met Leu Lys Ala Glu Lys Ile Pro Leu Ser Lys
 100 105 110
 Val Asp Lys Val Asn Ile Ser Arg Asn Ala Ala Ile Lys Lys Asn Met
 115 120 125
 Lys Ile Ser Ile Thr Arg Val Asn Ser Gln Ile Thr Lys Glu Asn Gln
 130 135 140
 Gln Val Asp Phe Pro Thr Glu Val Ile Ser Asp Asp Ser Met Gly Asn
 145 150 155 160
 Asp Glu Lys Gln Val Ile Gln Gln Gly Gln Ala Gly Glu Lys Glu Val
 165 170 175
 Phe Thr Lys Ile Val Tyr Glu Asp Gly Lys Ala Val Ser Lys Glu Ile
 180 185 190
 Val Gly Glu Val Ile Lys Lys Glu Pro Thr Lys Gln Val Phe Lys Val
 195 200 205
 Gly Thr Leu Gly Val Leu Lys Pro Asp Arg Gly Gly Arg Val Leu Tyr
 210 215 220
 Lys Lys Ser Leu Gln Val Leu Ala Thr Ala Tyr Thr Asp Asp Phe Ser
 225 230 235 240

Phe Gly Ile Thr Ala Ser Gly Thr Lys Val Lys Arg Asp Ser Asp Gly
245 250 255
Tyr Ser Ser Ile Ala Val Asp Pro Thr Val Ile Pro Leu Gly Thr Lys
260 265 270
Leu Tyr Val Pro Gly Tyr Gly Tyr Gly Val Val Ala Glu Asp Thr Gly
275 280 285
Gly Ala Ile Lys Gly Asn Arg Leu Asp Leu Phe Phe Thr Ser Glu Arg
290 295 300
Glu Cys Tyr Asp Trp Gly Ala Lys Asn Val Thr Val Tyr Ile Leu Lys
305 310 315 320

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 81 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Ala Glu Ala Tyr Thr Ala Ser Gly Met His Val Leu Arg Asp Pro Asn
1 5 10 15
Gly Tyr Ser Thr Ile Ala Val Asp Pro Ser Val Ile Pro Leu Gly Thr
20 25 30
Lys Leu Tyr Val Glu Gly Tyr Gly Tyr Ala Ile Ile Ala Ala Asp Thr
35 40 45
Gly Gly Ala Ile Lys Gly Asn Arg Val Asp Leu Phe Phe Asn Thr Glu
50 55 60
Ala Glu Ala Ser Asn Trp Gly Val Arg Asn Leu Asp Val Tyr Ile Leu
65 70 75 80
Asn

(2) INFORMATION FOR SEQ ID NO:13:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 51 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Thr Ile Val Val Lys Ser Gly Asp Ser Leu Trp Thr Leu Ala Asn Glu
 1 5 10 15
 Tyr Glu Val Glu Gly Gly Trp Thr Ala Leu Tyr Glu Ala Asn Lys Gly
 20 25 30
 Ala Val Ser Asp Ala Ala Val Ile Tyr Val Gly Gln Glu Leu Val Leu
 35 40 45
 Pro Gln Ala
 50

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 46 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Thr Ile Lys Val Lys Ser Gly Asp Ser Leu Trp Lys Leu Ser Arg Gln
 1 5 10 15
 Tyr Asp Thr Thr Ile Ser Ala Leu Lys Ser Glu Asn Lys Leu Lys Ser
 20 25 30
 Thr Val Leu Tyr Val Gly Gln Ser Leu Lys Val Pro Glu Ser
 35 40 45

(2) INFORMATION FOR SEQ ID NO:15:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 44 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Thr Ile Lys Val Lys Ser Gly Asp Ser Leu Trp Lys Leu Ala Gln Thr
 1 5 10 15
 Tyr Asn Thr Ser Val Ala Ala Leu Thr Ser Ala Asn His Leu Ser Thr
 20 25 30
 Thr Val Leu Ser Ile Gly Gln Thr Leu Thr Ile Pro
 35 40

(2) INFORMATION FOR SEQ ID NO:16:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 43 amino acids
 (B) TYPE: amino acid

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

Thr	Tyr	Thr	Val	Lys	Ser	Gly	Asp	Ser	Leu	Trp	Val	Ile	Ala	Gln	Lys
1				5					10					15	
Phe	Asn	Val	Thr	Ala	Gln	Gln	Ile	Arg	Glu	Lys	Asn	Asn	Leu	Lys	Thr
			20					25					30		
Asp	Val	Leu	Gln	Val	Gly	Gln	Lys	Leu	Val	Ile					
			35				40								

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 43 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

66

Lys	Tyr	Thr	Val	Lys	Ser	Gly	Asp	Ser	Leu	Trp	Lys	Ile	Ala	Asn	Asn
1				5					10					15	
Ile	Asn	Leu	Thr	Val	Gln	Gln	Ile	Arg	Asn	Ile	Asn	Asn	Leu	Lys	Ser
			20					25					30		
Asp	Val	Leu	Tyr	Val	Gly	Gln	Val	Leu	Lys	Leu					
			35				40								

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 45 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

Thr	Tyr	Thr	Val	Lys	Ser	Gly	Asp	Thr	Ile	Trp	Ala	Leu	Ser	Ser	Lys
1				5					10					15	
Tyr	Gly	Thr	Ser	Val	Gln	Asn	Ile	Met	Ser	Trp	Asn	Asn	Leu	Ser	Ser
			20					25					30		
Ser	Ser	Ile	Tyr	Val	Gly	Gln	Val	Leu	Ala	Val	Lys	Gln			
			35				40					45			

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 45 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

Thr	His	Ala	Val	Lys	Ser	Gly	Asp	Thr	Ile	Trp	Ala	Leu	Ser	Val	Lys
1				5					10					15	
Tyr	Gly	Val	Ser	Val	Gln	Asp	Ile	Met	Ser	Trp	Asn	Asn	Leu	Ser	Ser
			20					25					30		
Ser	Ser	Ile	Tyr	Val	Gly	Gln	Lys	Leu	Ala	Ile	Lys	Gln			
		35					40					45			

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 46 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

C4

Ser	Val	Lys	Val	Lys	Ser	Gly	Asp	Thr	Leu	Trp	Ala	Leu	Ser	Val	Lys
1				5					10					15	
Tyr	Lys	Thr	Ser	Ile	Ala	Gln	Leu	Lys	Ser	Trp	Asn	His	Leu	Ser	Ser
			20					25					30		
Asp	Thr	Ile	Tyr	Ile	Gly	Gln	Asn	Leu	Ile	Val	Ser	Gln	Ser		
		35					40					45			

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 43 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

Thr	Tyr	Thr	Val	Lys	Ser	Gly	Asp	Thr	Leu	Trp	Gly	Ile	Ser	Gln	Arg
1				5					10					15	
Tyr	Gly	Ile	Ser	Val	Ala	Gln	Ile	Gln	Ser	Ala	Asn	Asn	Leu	Lys	Ser
			20					25					30		
Thr	Ile	Ile	Tyr	Ile	Gly	Gln	Lys	Leu	Leu	Leu					
		35					40								

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 60 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Thr Tyr Thr Val Lys Lys Gly Asp Thr Leu Trp Asp Ile Ala Gly Arg
 1 5 10 15
 Phe Tyr Gly Asn Ser Thr Gln Trp Arg Lys Ile Trp Asn Ala Asn Lys
 20 25 30
 Thr Ala Met Ile Lys Arg Ser Lys Arg Asn Ile Arg Gln Pro Gly His
 35 40 45
 Trp Ile Phe Pro Gly Gln Lys Leu Lys Ile Pro Gln
 50 55 60

(2) INFORMATION FOR SEQ ID NO:23:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 60 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Thr Tyr Thr Val Lys Lys Gly Asp Thr Leu Trp Asp Leu Ala Gly Lys
 1 5 10 15
 Phe Tyr Gly Asp Ser Thr Lys Trp Arg Lys Ile Trp Lys Val Asn Lys
 20 25 30
 Lys Ala Met Ile Lys Arg Ser Lys Arg Asn Ile Arg Gln Pro Gly His
 35 40 45
 Trp Ile Phe Pro Gly Gln Lys Leu Lys Ile Pro Gln
 50 55 60

(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 167 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Ala Pro Pro Val Glu Leu Ala Ala Asn Asp Leu Pro Ala Pro Leu Gly
 1 5 10 15
 Glu Pro Leu Pro Ala Ala Pro Ala Asp Pro Ala Pro Pro Ala Asp Leu
 20 25 30
 Ala Pro Pro Ala Pro Ala Asp Val Ala Pro Pro Val Glu Leu Ala Val
 35 40 45
 Asn Asp Leu Pro Ala Pro Leu Gly Glu Pro Leu Pro Ala Ala Pro Ala
 50 55 60
 Asp Pro Ala Pro Pro Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu
 65 70 75 80
 Ala Pro Pro Ala Pro Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu
 85 90 95
 Ala Pro Pro Val Glu Leu Ala Val Asn Asp Leu Pro Ala Pro Leu Gly
 100 105 110
 Glu Pro Leu Pro Ala Ala Pro Ala Glu Leu Ala Pro Pro Ala Asp Leu
 115 120 125
 Ala Pro Ala Ser Ala Asp Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala
 130 135 140
 Pro Pro Ala Pro Ala Glu Leu Ala Pro Pro Ala Pro Ala Asp Leu Ala
 145 150 155 160
 Pro Pro Ala Ala Val Asn Glu
 165

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 11 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Ala Pro Pro Val Glu Leu Ala Ala Asn Asp Leu
 1 5 10

(2) INFORMATION FOR SEQ ID NO:26:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 11 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Ala Pro Pro Val Glu Leu Ala Val Asn Asp Leu
1 5 10

(2) INFORMATION FOR SEQ ID NO:27:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 15 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear


(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Pro Ala Pro Leu Gly Glu Pro Leu Pro Ala Ala Pro Ala Asp Leu
1 5 10 15

(2) INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 15 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

 Pro Ala Pro Leu Gly Glu Pro Leu Pro Ala Ala Pro Ala Glu Leu
1 5 10 15

(2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 7 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Pro Ala Pro Pro Ala Asp Leu
1 5

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 8 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Ala Pro Pro Ala Pro Ala Asp Leu
1 5

(2) INFORMATION FOR SEQ ID NO:31:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 8 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

Ala Pro Pro Ala Pro Ala Asp Val
1 5

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 8 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

Ala Pro Pro Ala Pro Ala Glu Leu
1 5

(2) INFORMATION FOR SEQ ID NO:33:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 8 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

Ala Pro Pro Ala Pro Ala Glu Val
1 5

(2) INFORMATION FOR SEQ ID NO:34:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 478 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

Met Asn Met Lys Lys Ala Thr Ile Ala Ala Thr Ala Gly Ile Ala Val
1 5 10 15

Thr Ala Phe Ala Ala Pro Thr Ile Ala Ser Ala Ser Thr Val Val Val
20 25 30

Glu Ala Gly Asp Thr Leu Trp Gly Ile Ala Gln Ser Lys Gly Thr Thr
35 40 45

Val Asp Ala Ile Lys Lys Ala Asn Asn Leu Thr Thr Asp Lys Ile Val
50 55 60

Pro Gly Gln Lys Leu Gln Val Asn Asn Glu Val Ala Ala Ala Glu Lys
65 70 75 80

Thr Glu Lys Ser Val Ser Ala Thr Trp Leu Asn Val Arg Thr Gly Ala
85 90 95

Gly Val Asp Asn Ser Ile Ile Thr Ser Ile Lys Gly Gly Thr Lys Val
100 105 110

Thr Val Glu Thr Thr Glu Ser Asn Gly Trp His Lys Ile Thr Tyr Asn
115 120 125

Asp Gly Lys Thr Gly Phe Val Asn Gly Lys Tyr Leu Thr Asp Lys Ala
130 135 140

Val Ser Thr Pro Val Ala Pro Thr Gln Glu Val Lys Lys Glu Thr Thr
145 150 155 160

Thr Gln Gln Ala Ala Pro Val Ala Glu Thr Lys Thr Glu Val Lys Gln
165 170 175

Thr Thr Gln Ala Thr Thr Pro Ala Pro Lys Val Ala Glu Thr Lys Glu
180 185 190

Thr Pro Val Ile Asp Gln Asn Ala Thr Thr His Ala Val Lys Ser Gly
195 200 205

Asp Thr Ile Trp Ala Leu Ser Val Lys Tyr Gly Val Ser Val Gln Asp
210 215 220

Ile Met Ser Trp Asn Asn Leu Ser Ser Ser Ser Ile Tyr Val Gly Gln
225 230 235 240

Lys Leu Ala Ile Lys Gln Thr Ala Asn Thr Ala Thr Pro Lys Ala Glu
245 250 255

Val Lys Thr Glu Ala Pro Ala Ala Glu Lys Gln Ala Ala Pro Val Val
260 265 270

Lys Glu Asn Thr Asn Thr Asn Thr Ala Thr Thr Glu Lys Lys Glu Thr
275 280 285

Ala Thr Gln Gln Gln Thr Ala Pro Lys Ala Pro Thr Glu Ala Ala Lys
290 295 300

Pro Ala Pro Ala Pro Ser Thr Asn Thr Asn Ala Asn Lys Thr Asn Thr
305 310 315 320

Asn Thr Asn Thr Asn Asn Thr Asn Thr Pro Ser Lys Asn Thr Asn Thr
325 330 335

Asn Ser Asn Thr Asn Thr Asn Thr Asn Ser Asn Thr Asn Ala Asn Gln
340 345 350

Gly Ser Ser Asn Asn Asn Ser Asn Ser Ser Ala Ser Ala Ile Ile Ala
355 360 365

Glu Ala Gln Lys His Leu Gly Lys Ala Tyr Ser Trp Gly Gly Asn Gly
370 375 380

Pro Thr Thr Phe Asp Cys Ser Gly Tyr Thr Lys Tyr Val Phe Ala Lys
385 390 395 400

Ala Gly Ile Ser Leu Pro Arg Thr Ser Gly Ala Gln Tyr Ala Ser Thr
405 410 415

Thr Arg Ile Ser Glu Ser Gln Ala Lys Pro Gly Asp Leu Val Phe Phe
420 425 430

Asp Tyr Gly Ser Gly Ile Ser His Val Gly Ile Tyr Val Gly Asn Gly
435 440 445

Gln Met Ile Asn Ala Gln Asp Asn Gly Val Lys Tyr Asp Asn Ile His
450 455 460

Gly Ser Gly Trp Gly Lys Tyr Leu Val Gly Phe Gly Arg Val
465 470 475

(2) INFORMATION FOR SEQ ID NO:35:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 758 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: double
 - (D) TOPOLOGY: linear

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 66..728

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

ACCAAGGAGA AGGACGACCC CGGTGTGCCT CGGCCGCCGA TCAGCGAGGA CTCGCCATGG	60
ACACC ATG ACT CTC TTC ACC ACT TCC GCC ACC CGC TCC CGC CGT GCC	107
Met Thr Leu Phe Thr Thr Ser Ala Thr Arg Ser Arg Arg Ala	
1 5 10	
ACC GCC TCG ATC GTC GCG GGC ATG ACC CTC GCC GGC GCC GCC GTG	155
Thr Ala Ser Ile Val Ala Gly Met Thr Leu Ala Gly Ala Ala Ala Val	

15	20	25	30	
GGC TTC TCC GCC CCG GCC CAG GCC GCC ACC GTG GAC ACC TGG GAC CGC				203
Gly Phe Ser Ala Pro Ala Gln Ala Ala Thr Val Asp Thr Trp Asp Arg	35	40	45	
CTC GCC GAG TGC GAG TCC AAC GGC ACC TGG GAC ATC AAC ACC GGC AAC				251
Leu Ala Glu Cys Glu Ser Asn Gly Thr Trp Asp Ile Asn Thr Gly Asn	50	55	60	
GGC TTC TAC GGC GGC GTG CAG TTC ACC CTG TCC TCC TGG CAG GCC GTC				299
Gly Phe Tyr Gly Gly Val Gln Phe Thr Leu Ser Ser Trp Gln Ala Val	65	70	75	
GGC GGC GAA GGC TAC CCG CAC CAG GCC TCG AAG GCC GAG CAG ATC AAG				347
Gly Gly Glu Gly Tyr Pro His Gln Ala Ser Lys Ala Glu Gln Ile Lys	80	85	90	
CGC GCC GAG ATC CTC CAG GAC CTG CAG GGC TGG GGC GCG TGG CCG CTG				395
Arg Ala Glu Ile Leu Gln Asp Leu Gln Gly Trp Gly Ala Trp Pro Leu	95	100	105	110
TGC TCG CAG AAG CTG GGC CTG ACC CAG GCT GAC GCG GAC GCC GGT GAC				443
Cys Ser Gln Lys Leu Gly Leu Thr Gln Ala Asp Ala Asp Ala Gly Asp	115	120	125	
GTG GAC GCC ACC GAG GCC GCC CCG GTC GCC GTG GAG CGC ACG GCC ACC				491
Val Asp Ala Thr Glu Ala Ala Pro Val Ala Val Glu Arg Thr Ala Thr	130	135	140	
GTG CAG CGC CAG TCC GCC GCG GAC GAG GCT GCC GCC GAG CAG GCC GCT				539
Val Gln Arg Gln Ser Ala Ala Asp Glu Ala Ala Ala Glu Gln Ala Ala	145	150	155	
GCC GCG GAG CAG GCC GTC GTC GCC GAG GCC GAG ACC ATC GTC GTC AAG				587
Ala Ala Glu Gln Ala Val Val Ala Glu Ala Glu Thr Ile Val Val Lys	160	165	170	
TCC GGT GAC TCC CTC TGG ACG CTC GCC AAC GAG TAC GAG GTG GAG GGT				635
Ser Gly Asp Ser Leu Trp Thr Leu Ala Asn Glu Tyr Glu Val Glu Gly	175	180	185	190
GGC TGG ACC GCC CTC TAC GAG GCC AAC AAG GGC GCC GTC TCC GAC GCC				683
Gly Trp Thr Ala Leu Tyr Glu Ala Asn Lys Gly Ala Val Ser Asp Ala	195	200	205	
GCC GTG ATC TAC GTC GGC CAG GAG CTC GTC CTG CCG CAG GCC TGAGACGCCT				735
Ala Val Ile Tyr Val Gly Gln Glu Leu Val Leu Pro Gln Ala	210	215	220	
GACCGGCCCC CCGGACCGGT ACC				758

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 220 amino acids

(B) TYPE: amino acid
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

Met Thr Leu Phe Thr Thr Ser Ala Thr Arg Ser Arg Arg Ala Thr Ala
1 5 10 15
Ser Ile Val Ala Gly Met Thr Leu Ala Gly Ala Ala Ala Val Gly Phe
20 25 30
Ser Ala Pro Ala Gln Ala Ala Thr Val Asp Thr Trp Asp Arg Leu Ala
35 40 45
Glu Cys Glu Ser Asn Gly Thr Trp Asp Ile Asn Thr Gly Asn Gly Phe
50 55 60
Tyr Gly Gly Val Gln Phe Thr Leu Ser Ser Trp Gln Ala Val Gly Gly
65 70 75 80
Glu Gly Tyr Pro His Gln Ala Ser Lys Ala Glu Gln Ile Lys Arg Ala
85 90 95
Glu Ile Leu Gln Asp Leu Gln Gly Trp Gly Ala Trp Pro Leu Cys Ser
100 105 110
Gln Lys Leu Gly Leu Thr Gln Ala Asp Ala Asp Ala Gly Asp Val Asp
115 120 125
Ala Thr Glu Ala Ala Pro Val Ala Val Glu Arg Thr Ala Thr Val Gln
130 135 140
Arg Gln Ser Ala Ala Asp Glu Ala Ala Ala Glu Gln Ala Ala Ala Ala
145 150 155 160
Glu Gln Ala Val Val Ala Glu Ala Glu Thr Ile Val Val Lys Ser Gly
165 170 175
Asp Ser Leu Trp Thr Leu Ala Asn Glu Tyr Glu Val Glu Gly Gly Trp
180 185 190
Thr Ala Leu Tyr Glu Ala Asn Lys Gly Ala Val Ser Asp Ala Ala Val
195 200 205
Ile Tyr Val Gly Gln Glu Leu Val Leu Pro Gln Ala
210 215 220

(2) INFORMATION FOR SEQ ID NO:37:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 33 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

GCSACSGTSG ACACSTGGGA CCGSCTSGCS GAG

33

(2) INFORMATION FOR SEQ ID NO:38:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 19 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

Ala	Thr	Val	Asp	Thr	Trp	Asp	Arg	Leu	Ala	Glu	Glu	Xaa	Ser	Asn	Gly
1				5					10					15	

Thr Xaa Asp

(2) INFORMATION FOR SEQ ID NO:39:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 18 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

CCGCCGTAGA AGCCGTTG

18

(2) INFORMATION FOR SEQ ID NO:40:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 19 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

AGTTCACCCT GTCCTCCTG

19

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ix) FEATURE:

(A) NAME/KEY: misc_feature
(B) LOCATION: 9
(D) OTHER INFORMATION: /note= "N is inosine"

(ix) FEATURE:

(A) NAME/KEY: misc_feature
(B) LOCATION: 15
(D) OTHER INFORMATION: /note= "N is inosine"

(ix) FEATURE:

(A) NAME/KEY: misc_feature
(B) LOCATION: 21
(D) OTHER INFORMATION: /note= "N is inosine"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

GCYTGRTGNG GRTANCCYTC NCC

23

(2) INFORMATION FOR SEQ ID NO:42:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 12 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

Val Gly Gly Glu Gly Tyr Pro His Gln Ala Ser Lys
1 5 10

(2) INFORMATION FOR SEQ ID NO:43:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 182 amino acids
(B) TYPE: amino acid
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:43:

Ala Thr Val Asp Thr Trp Asp Arg Leu Ala Glu Cys Glu Ser Asn Gly
1 5 10 15

Thr Trp Asp Ile Asn Thr Gly Asn Gly Phe Tyr Gly Gly Val Gln Phe
20 25 30

Thr Leu Ser Ser Trp Gln Ala Val Gly Gly Glu Gly Tyr Pro His Gln
35 40 45

Ala Ser Lys Ala Glu Gln Ile Lys Arg Ala Glu Ile Leu Gln Asp Leu
50 55 60

Gln Gly Trp Gly Ala Trp Pro Leu Cys Ser Gln Lys Leu Gly Leu Thr
65 70 75 80

Gln Ala Asp Ala Asp Ala Gly Asp Val Asp Ala Thr Glu Ala Ala Pro
85 90 95

Val Ala Val Glu Arg Thr Ala Thr Val Gln Arg Gln Ser Ala Ala Asp
100 105 110

Glu Ala Ala Ala Glu Gln Ala Ala Ala Glu Gln Ala Val Val Ala
115 120 125

Glu Ala Glu Thr Ile Val Val Lys Ser Gly Asp Ser Leu Trp Thr Leu
130 135 140

Ala Asn Glu Tyr Glu Val Glu Gly Gly Trp Thr Ala Leu Tyr Glu Ala
145 150 155 160

Asn Lys Gly Ala Val Ser Asp Ala Ala Val Ile Tyr Val Gly Gln Glu
165 170 175

Leu Val Leu Pro Gln Ala
180

(2) INFORMATION FOR SEQ ID NO:44:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 299 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: double
(D) TOPOLOGY: linear

- (ix) FEATURE:
(A) NAME/KEY: CDS
(B) LOCATION: 3..299

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:44:

GG ATC CGC ACC GCC GCG GTA ACC CTG GTC GCC GCG ACC GCA CTC GGG	47
Ile Arg Thr Ala Ala Val Thr Leu Val Ala Ala Thr Ala Leu Gly	
1 5 10 15	
GCG ACC GGC GAA GCG GTG GCC GCG CCC TCG GCG CCC CTG CGC ACC GAC	95
Ala Thr Gly Glu Ala Val Ala Ala Pro Ser Ala Pro Leu Arg Thr Asp	
20 25 30	
TGG GAC GCC ATC GCC GCG TGC GAG TCC AGC GGC AAC TGG CAG GCG AAC	143
Trp Asp Ala Ile Ala Ala Cys Glu Ser Ser Gly Asn Trp Gln Ala Asn	
35 40 45	
ACC GGC AAC GGC TAC TAC GGC GGC CTG CAG TTC GCA CGG TCC AGC TGG	191

Thr	Gly	Asn	Gly	Tyr	Tyr	Gly	Gly	Leu	Gln	Phe	Ala	Arg	Ser	Ser	Trp	
	50						55					60				
ATC	GCC	GCC	GGC	GGC	CTC	AAG	TAC	GCC	CCG	CGC	GCG	GAC	CTC	GCC	ACC	239
Ile	Ala	Ala	Gly	Gly	Leu	Lys	Tyr	Ala	Pro	Arg	Ala	Asp	Leu	Ala	Thr	
	65					70				75						
CGC	GGC	GAG	CAG	ATC	GCC	GTG	GCG	GAA	CGC	CTC	GCC	CGT	CTG	CAG	GGG	287
Arg	Gly	Glu	Gln	Ile	Ala	Val	Ala	Glu	Arg	Leu	Ala	Arg	Leu	Gln	Gly	
	80				85				90					95		
ATG	TCC	GCC	TGG													299
Met	Ser	Ala	Trp													

(2) INFORMATION FOR SEQ ID NO:45:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 99 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

Ile Arg Thr Ala Ala Val Thr Leu Val Ala Ala Thr Ala Leu Gly Ala
 1 5 10 15
 Thr Gly Glu Ala Val Ala Ala Pro Ser Ala Pro Leu Arg Thr Asp Trp
 20 25 30
 Asp Ala Ile Ala Ala Cys Glu Ser Ser Gly Asn Trp Gln Ala Asn Thr
 35 40 45
 Gly Asn Gly Tyr Tyr Gly Gly Leu Gln Phe Ala Arg Ser Ser Trp Ile
 50 55 60
 Ala Ala Gly Gly Leu Lys Tyr Ala Pro Arg Ala Asp Leu Ala Thr Arg
 65 70 75 80
 Gly Glu Gln Ile Ala Val Ala Glu Arg Leu Ala Arg Leu Gln Gly Met
 85 90 95
 Ser Ala Trp

(2) INFORMATION FOR SEQ ID NO:46:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 34 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

GTCAGAATTC ATATGGCCAC CGTGGACACC TGGG

34

(2) INFORMATION FOR SEQ ID NO:47:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 33 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:


TGACGGATCC TATTAGGCCT GCGGCAGGAC GAG

33

(2) INFORMATION FOR SEQ ID NO:48:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 35 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:48:

ATCAGAATTC ATATGGACGA CATCGATTGG GACGC

35

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 29 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

CGCAGGATCC CCTCAATCGT CCCTGCTCC

29

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

GAAGAGAATT CCTTCCATCA CGA

23

(2) INFORMATION FOR SEQ ID NO:51:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 22 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

CCAAACGAAT TCGGTCAATC AC

22

(2) INFORMATION FOR SEQ ID NO:52:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 26 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

GCAAGGATCC CAGACTAAAA AAACAG

26

(2) INFORMATION FOR SEQ ID NO:53:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 27 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:53:

ATCAGGATCC ATATTATTAG TTTAAGA

27

(2) INFORMATION FOR SEQ ID NO:54:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 663 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single stranded
 - (D) TOPOLOGY: linear

(ix) FEATURE:

(A) NAME/KEY: CDS
(B) LOCATION: 1..663

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:54:

atg act ctc ttc acc act tcc gcc acc cgc tcc cgc cgt gcc acc gcc	48
Met Thr Leu Phe Thr Thr Ser Ala Thr Arg Ser Arg Arg Ala Thr Ala	
1 5 10 15	
tcg atc gtc gcg ggc atg acc ctc gcc ggc gcc gcc gcc gtg ggc ttc	96
Ser Ile Val Ala Gly Met Thr Leu Ala Gly Ala Ala Ala Val Gly Phe	
20 25 30	
tcc gcc ccg gcc cag gcc gcc acc gtg gac acc tgg gac cgc ctc gcc	144
Ser Ala Pro Ala Gln Ala Ala Thr Val Asp Thr Trp Asp Arg Leu Ala	
35 40 45	
gag tgc gag tcc aac ggc acc tgg gac atc aac acc ggc aac ggc ttc	192
Glu Cys Glu Ser Asn Gly Thr Trp Asp Ile Asn Thr Gly Asn Gly Phe	
50 55 60	
tac ggc ggc gtg cag ttc acc ctg tcc tcc tgg cag gcc gtc ggc ggc	240
Tyr Gly Gly Val Gln Phe Thr Leu Ser Ser Trp Gln Ala Val Gly Gly	
65 70 75 80	
gaa ggc tac ccg cac cag gcc tcg aag gcc gag cag atc aag cgc gcc	288
Glu Gly Tyr Pro His Gln Ala Ser Lys Ala Glu Gln Ile Lys Arg Ala	
85 90 95	
gag atc ctc cag gac ctg cag ggc tgg ggc gcg tgg ccg ctg tgc tcg	336
Glu Ile Leu Gln Asp Leu Gln Gly Trp Gly Ala Trp Pro Leu Cys Ser	
100 105 110	
cag aag ctg ggc ctg acc cag gct gac gcg gac gcc ggt gac gtg gac	384
Gln Lys Leu Gly Leu Thr Gln Ala Asp Ala Asp Ala Gly Asp Val Asp	
115 120 125	
gcc acc gag gcc gcc ccg gtc gcc gtg gag cgc acg gcc acc gtg cag	432
Ala Thr Glu Ala Ala Pro Val Ala Val Glu Arg Thr Ala Thr Val Gln	
130 135 140	
cgc cag tcc gcc gcg gac gag gct gcc gcc gag cag gcc gct gcc gcg	480
Arg Gln Ser Ala Ala Asp Glu Ala Ala Ala Glu Gln Ala Ala Ala	
145 150 155 160	
gag cag gcc gtc gtc gcc gag gcc gag acc atc gtc gtc aag tcc ggt	528
Glu Gln Ala Val Val Ala Glu Ala Glu Thr Ile Val Val Lys Ser Gly	
165 170 175	
gac tcc ctc tgg acg ctc gcc aac gag tac gag gtg gag ggt ggc tgg	576
Asp Ser Leu Trp Thr Leu Ala Asn Glu Tyr Glu Val Glu Gly Gly Trp	
180 185 190	
acc gcc ctc tac gag gcc aac aag ggc gcc gtc tcc gac gcc gcc gtg	624
Thr Ala Leu Tyr Glu Ala Asn Lys Gly Ala Val Ser Asp Ala Ala Val	
195 200 205	

atc tac gtc ggc cag gag ctc gtc ctg ccg cag gcc tga
 Ile Tyr Val Gly Gln Glu Leu Val Leu Pro Gln Ala
 210 215 220

663

(2) INFORMATION FOR SEQ ID NO:55:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 6 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:55:

Ala Pro Pro Ala Asp Leu
 1 5

(2) INFORMATION FOR SEQ ID NO:56:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 7 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:56:

Ala Pro Ala Ser Ala Asp Leu
 1 5

(2) INFORMATION FOR SEQ ID NO:57:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 8 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:57:

Ala Pro Pro Ala Pro Ala Glu Leu
 1 5

(2) INFORMATION FOR SEQ ID NO:58:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 4 amino acids
 - (B) TYPE: amino acid
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:58:

Ala Pro Pro Ala
1

(2) INFORMATION FOR SEQ ID NO:59:

- (i) SEQUENCE CHARACTERISTICS:
 (A) LENGTH: 4 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:59:

Ala Val Asn Asp
1

04